ANNALS OF THE POLISH ASSOCIATION
OF AGRICULTURAL AND AGRIBUSINESS ECONOMISTS

ROCZNIKI NAUKOWE
STOWARZYSZENIA EKONOMISTÓW ROLNICTWA I AGROBIZNESU

Received: 02.01.2025
Acceptance: 27.02.2025
Published: 11.03.2025

JEL codes: Q00, Q10, Q11

Annals PAAAE • 2025 • Vol. XXVII • No. (1)

DOI: 10.5604/01.3001.0054.9894

TOMASZ ROKICKI[1]

Warsaw University of Life Sciences – SGGW, Poland

CHANGES IN SHEEP POPULATION AND LIVE LAMB LIVESTOCK PRODUCTION IN POLAND IN 2005-2023

Keywords: sheep, sheep population, meat production, lamb meat market, regional differentiation

ABSTRACT. The main objective of the study was to determine changes in the sheep population and lamb livestock production in Poland, directly after accession to the European Union and in the following years, as well as to identify emerging trends in this regard. The study also identified periods with the highest and lowest sheep population and lamb livestock production and analyzed patterns occurring in this respect. The data sources used in the study were obtained from the Local Data Bank of the Central Statistical Office of Poland (GUS). The research period covered the years 2005-2023. Descriptive, tabular, and graphical methods were used for analysis and presentation, along with fixed and variable-base dynamic indices, the Gini coefficient, and the Lorenz concentration curve. The analysis indicates that after Poland's accession to the EU, the sheep population decreased by 15%, while lamb livestock production declined by 30%. The changes in sheep population and livestock production varied across different regions. In general, the number of sheep decreased in provinces with large sheep populations and increased in regions with minimal sheep farming significance. Similar trends were observed in lamb livestock production. As a result, the concentration of both the sheep population and lamb livestock production decreased, with a more significant decline observed in the concentration of the sheep population.

[1] Corresponding author: tomasz_rokicki@sggw.edu.pl

INTRODUCTION

Matyka, Krasowicz and Kopiński (2016) point out that structural transformations, originating in the internal and external environment of the sector, are associated with every adjustment and development process. Transformations may concern, among other things, the level and structure of production, the degree of concentration and specialisation (Matyka, Krasowicz, Kopiński, Kuś, 2013). External factors are mainly changes in various dimensions of the environment of farms and the entire agricultural and food sector (Kuś, Matyka, 2014). Poczta, Czubak and Pawlak (2009) point out the importance of a higher level of support for farmers through subsidies paid, in the period after European Union (UE) accession. In addition, internal conditions, different in each region and farm, are important. The environmental aspect in particular has gained importance in recent years (Kopiński, 2018).

In Poland, livestock production is the dominant sector in the structure of agricultural commodity production. This type of activity is characterised by high variability in the profitability of production. Fluctuations in the prices of animal products and fodder, in turn, may cause changes in the livestock population and consequently affect the production obtained from animals (Kopiński, 2009).

In the case of sheep production, historical and natural conditions have to be especially taken into account. Such conditions influence the processes of concentration, specialisation and spatial polarisation of production, especially precisely in livestock production (Parzonko, 2014; Pepliński, 2017; Kopiński, 2018; Pepliński, 2019). In the case of sheep production, the often regional nature of this activity must be taken into account

The research carried out fills a research gap. There is a lack of research on changes in lamb livestock and production in individual voivodeships of Poland. This type of research can be useful for farmers and for decision-makers shaping agricultural policy at various levels. In addition, research is important for society. Sheep provide commodity products but also perform important social and environmental functions. Another justification for the research is to examine the period after Poland's accession to the EU, i.e. after the introduction of the Common Agricultural Policy. It is important to show how this affected the sheep population and lamb livestock production at different times, i.e. immediately after accession and in subsequent years.

The main objective of the study was to determine changes in sheep populations and lamb livestock production in Poland and to identify patterns occurring in this regard. The specific objectives were to show changes in sheep populations and lamb livestock production immediately after accession to the EU and in subsequent years, to identify periods with the highest and lowest sheep populations and lamb livestock production, and to identify patterns in this regard.

The paper has one research hypothesis: sheep populations and lamb livestock production in Poland have been subject to little change, the greatest in voivodeships with a high importance of this activity.

MATERIAL AND METHODS

This article presents the sheep population, including ewes (i.e. female sheep that have already had offspring and females covered for the first time), and the production of live lamb in Poland in several breakdowns. Sources of materials are provided by the Bank of Local Data Central Statistical Office (CSO). The research period covered the years 2005-2023. Descriptive, tabular, graphical methods, constant and variable base dynamics indices, Gini coefficient, Lorenz concentration curve were used to analyse and present the materials.

The research was carried out in several phases. In the first phase, the focus was on the sheep population in Poland in 2023 and the share of ewes in the population from 2005 to 2023. In this way, the production potential in the individual voivodeships was presented.

The second stage focused on showing the dynamics of changes in the sheep and ewe population in Poland from 2005 to 2023. Data in 4-year periods (2005-2009, 2009-2013, 2013-2017, 2017-2021) were analysed, for the last period of 3 years (2021-2023). In this way, it is possible to determine the patterns occurring in individual periods and voivodeships. In addition to this, dynamics indices for prices were calculated for the entire period.

The third stage of the research focuses on showing the production of live lamb in Poland in 2023. Livestock production was calculated according to the methodology proposed by the Central Statistical Office, i.e. (slaughterings + exports of live animals) imports of live animals. In addition, changes in this production between 2005 and 2023 were calculated. This was done in a similar way to the sheep population, i.e. the indicators related to individual periods and voivodeships.

In the fourth stage, changes in the concentration of sheep stock and lamb livestock production in Poland in the years 2005-2023 were determined. The Gini coefficient and the Lorenz concentration curve were used. The result will be the determination of the directions of changes in concentration with regard to the studied traits.

RESULTS

SHEEP POPULATION IN POLAND IN 2023

In 2023, the sheep population in Poland amounted to 270,000 heads, of which 150,000 were ewes. The sheep population varied in individual voivodeships (Figure 1). The largest number of these animals (66 thousand heads) was kept on farms in the Małopolskie Voivodeship. This accounted for ¼ of all sheep in Poland. This region is traditionally associated with sheep production, including the production of cheese from sheep's milk. The Wielkopolskie Voivodship kept 28.27 thousand sheep, which accounted for 10.45% of the sheep population in the country. Third place in terms of stock was occupied by Podlaskie Voivodship with 24.21 thousand, which accounted for 8.95% of sheep in Poland. The Lubelskie (18.22 thousand sheep), Pomorskie (15.76 thousand), and Warmińsko-Mazurskie (15.15 thousand) voivodeships were also noteworthy. The smallest stock was in the Opolskie (3.08 thousand head), Lubuskie (5.95 thousand head) and Świętokrzyskie (6.26 thousand head) voivodeships. At the same time, these were voivodeships with a small area. In the remaining voivodeships, sheep populations were kept in the range of 10 to 15 thousand heads. The specific nature of sheep production in the individual regions of Poland should also be taken into account, i.e. the maintenance of many very different breeds of sheep, often adapted to the natural conditions of a given region and traditionally maintained for many years.

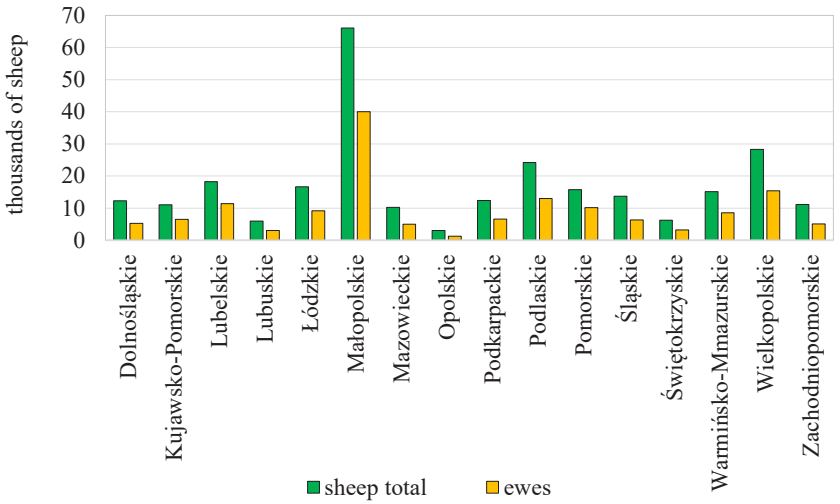

Figure 1. Population of total and ewes in the voivodeships of Poland in 2023
Source: own compilation based on Local Data Bank data (GUS BDL, 2024)

SHARE OF EWES IN THE SHEEP POPULATION IN POLAND 2005-2023

Ewes are animals that indicate the potential for lamb production, i.e. also for the production of lamb livestock. It can be concluded that the share of this group of animals in the sheep population in Poland has been declining (Table 1). In 2005, ewes accounted for 66.95% of all sheep in Poland, and in 2023 already 55.52%. In individual voivodeships it was different, because there were both regions with a very large decrease in the share of ewes in the sheep population (Opolskie, Dolnośląskie, Podkarpackie, Świętokrzyskie, Łódzkie, Zachodniopomorskie), maintaining a similar share (Podlaskie, Mazowieckie, Kujawsko-Pomorskie). The only increase was recorded for the Pomeranian Voivodeship. The reason for the decrease in the share of ewes in the sheep population may be a change in the way sheep are used. The duration of keeping lambs on farms has increased. Previously, lambs were sold for export when they were over 100 days old or earlier. The disposal of lambs for the domestic market has resulted in an increase in lamb retention time to 6 months or even longer. Lambs are sold at higher weights.

Table 1. Share of ewes in the sheep population in the voivodeships of Poland 2005-2023

Voivodeships	Share of ewes in the sheep population in years					
	2005	2009	2013	2017	2021	2023
Dolnośląskie	70.87	73.47	65.79	70.00	48.16	43.10
Kujawsko-Pomorskie	61.76	65.45	50.79	56.05	51.45	59.21
Lubelskie	69.59	73.85	66.07	57.17	64.25	62.35
Lubuskie	64.74	50.67	56.51	56.94	56.92	50.53
Lódzkie	74.09	66.14	68.32	55.86	50.93	54.78
Małopolskie	74.80	83.35	71.75	69.38	59.66	60.64
Mazowieckie	51.70	70.56	54.04	59.42	32.56	48.93
Opolskie	72.13	40.25	62.42	58.80	38.25	40.31
Podkarpackie	79.28	59.20	69.99	64.76	53.66	53.82
Podlaskie	55.77	63.80	51.47	54.56	49.78	53.79
Pomorskie	55.29	72.21	63.90	54.36	56.80	64.70
Śląskie	55.53	60.87	63.72	62.48	50.34	46.09
Świętokrzyskie	72.11	58.00	65.02	53.95	55.01	51.54
Warmińsko-Mazurskie	68.49	74.20	54.24	60.86	55.31	56.20
Wielkopolskie	61.78	65.15	65.24	57.40	35.35	54.61
Zachodniopomorskie	63.62	74.92	47.81	50.45	44.09	46.00
Poland	66.95	70.59	63.81	62.05	52.14	55.52

Source: own compilation based on Local Data Bank data (GUS BDL, 2024)

DYNAMICS OF CHANGE IN THE SHEEP AND EWE POPULATION IN POLAND 2005-2023

The next step presents changes in the sheep population in Poland by voivodeship over periods of several years (Table 2). In general, there was a 15% decrease in the sheep population in Poland between 2005 and 2023, but changes varied from period to period. The most favourable period was 2013-2017, and the least favourable was the first post-acceptance years. In the remaining periods, the population was stable. Changes varied between voivodeships. Half of the voivodeships saw an increase in sheep populations, the largest in Zachodniopomorskie, Lubuskie, Warmińsko-Mazurskie and Świętokrzyskie.

Table 2. Dynamics indicators for sheep populations in Polish voivodeships from 2005 to 2023

Voivodeships	Dynamics of change in total sheep population in years					
	2005-2009	2009-2013	2013-2017	2017-2021	2021-2023	2005-2023
Dolnośląskie	112.16	97.34	162.26	79.67	104.21	147.07
Kujawsko-Pomorskie	61.23	73.30	54.46	152.89	107.88	40.32
Lubelskie	52.67	123.85	122.25	96.10	103.39	79.23
Lubuskie	144.04	90.67	144.33	107.13	91.63	185.03
Lódzkie	86.07	50.49	160.21	107.69	110.23	82.65
Małopolskie	65.93	104.91	134.88	79.61	96.85	71.93
Mazowieckie	56.23	117.92	97.00	166.29	99.29	106.20
Opolskie	118.43	135.94	97.34	88.20	122.18	168.90
Podkarpackie	92.07	93.28	145.74	61.81	105.92	81.95
Podlaskie	66.62	113.90	132.00	93.68	99.45	93.32
Pomorskie	87.64	172.48	90.44	101.23	99.43	137.60
Śląskie	57.20	92.61	121.48	106.59	96.59	66.26
Świętokrzyskie	83.06	86.34	150.10	136.35	106.55	156.40
Warmińsko-Mazurskie	80.56	151.90	69.29	193.98	107.40	176.64
Wielkopolskie	66.25	72.88	115.46	111.11	111.20	68.88
Zachodniopomorskie	96.43	130.36	82.69	207.41	97.51	210.23
Poland	70.52	99.56	120.39	98.78	101.97	85.15

Source: own compilation based on Local Data Bank data (GUS BDL, 2024)

These were voivodeships with small sheep populations, where small changes in numbers resulted in high dynamics of change. The largest decrease in the sheep population occurred in the Kujawsko-Pomorskie Voivodship (by 60%), followed by the Śląskie Voivodship (34%) and the Wielkopolskie Voivodship (31%). As a rule, these were voivodeships maintaining larger sheep populations. In individual periods for most voivodeships the patterns were similar to those for Poland, i.e. the first accession years were the most difficult, while the period 2013-2017 was the best. This was particularly evident in the case of voivodeships with the largest sheep populations. The change in sheep numbers was strongly influenced by agricultural policy. The introduced instruments of support for sheep production contributed to the stabilisation or growth of the sheep population.

Table 3. Dynamics indicators for the population of ewes in the voivodeships of Poland from 2005 to 2023

Voivodeships	Dynamics of change in the ewe population over the years					
	2005-2009	2009-2013	2013-2017	2017-2021	2021-2023	2005-2023
Dolnośląskie	116.26	87.18	172.63	54.82	93.26	89.45
Kujawsko-Pomorskie	64.89	56.88	60.10	140.35	124.15	38.65
Lubelskie	55.90	110.80	105.78	108.00	100.34	70.99
Lubuskie	112.74	101.11	145.42	107.11	81.34	144.42
Łódzkie	76.83	52.15	131.00	98.18	118.57	61.10
Małopolskie	73.47	90.31	130.42	68.45	98.44	58.31
Mazowieckie	76.75	90.32	106.65	91.11	149.24	100.52
Opolskie	66.08	210.82	91.70	57.38	128.73	94.37
Podkarpackie	68.76	110.28	134.84	51.22	106.22	55.63
Podlaskie	76.20	91.89	139.93	85.47	107.46	90.00
Pomorskie	114.45	152.65	76.94	105.77	113.25	161.01
Śląskie	62.71	96.94	119.12	85.89	88.42	55.00
Świętokrzyskie	66.81	96.78	124.54	139.03	99.85	111.78
Warmińsko-Mazurskie	87.27	111.04	77.75	176.28	109.12	144.93
Wielkopolskie	69.86	72.98	101.58	68.43	171.80	60.88
Zachodniopomorskie	113.56	83.20	87.25	181.25	101.75	152.02
Poland	74.36	90.00	117.07	83.00	108.58	70.61

Source: own compilation based on Local Data Bank data (GUS BDL, 2024)

For ewes, the decline in their stock was even greater than for sheep in general (Table 3). Between 2005 and 2023, the ewe population fell by 29%. Only in the period 2013-2017 was there an increase of 17% and in 2021-2023 of 9%. In the other periods there were decreases in the ewe population. Generally, increases in ewe stock were in voivodeships that were of low importance in sheep production, e.g. Pomorskie, Zachodniopomorskie, Warmińsko-Mazurskie and Lubuskie voivodeships. On the other hand, the largest decrease in stock occurred in the Kujawsko-Pomorskie, Śląskie, Podkarpackie and Małopolskie voivodeships. Only the Małopolskie Voivodeship was significant in terms of sheep production. In general, trends were similar to those for the total sheep population. The periods 2013-2017 and 2021-2023 were particularly favourable, when increases in the ewe population were recorded in 11 voivodeships. Here again, it is necessary to link changes in the stocking rate to the level of support for this production.

LAMB LIVESTOCK PRODUCTION IN POLAND IN 2023

The next stage focuses on the production of live lamb (Figure 2). In 2023, the largest production was recorded in the Lubelskie Voivodeship (15.74% share of the Polish market), followed by the Mazowieckie (14.25%), Pomorskie (12.95%) and Kujawsko-Pomorskie voivodeships (10.29%). These four voivodeships accounted for 53% of total lamb livestock production in Poland. At the same time, these were not voivodeships where large sheep populations were maintained. The Małopolskie, Wielkopolskie and Podlaskie voivodeships were in the middle of the pack. The reason for this is the way in which livestock production

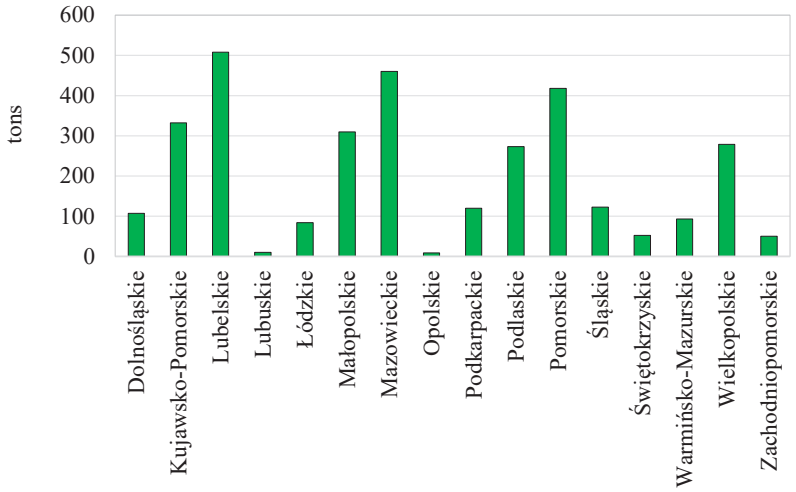

Figure 2. Lamb livestock production in the voivodeships of Poland in 2023
Source: own compilation based on Local Data Bank data (GUS BDL, 2024)

is counted, which takes into account slaughterings carried out within a given voivodship and the export and import of live animals. Foreign trade in live animals has been greatly reduced, so slaughterings are decisive. It is also important to locate abattoirs close to large markets such as Warsaw, the seaside and in mountainous areas.

DYNAMICS OF CHANGE IN LAMB LIVESTOCK PRODUCTION POLAND FROM 2005 TO 2023

Lamb livestock production in Poland decreased by 36% between 2005 and 2023 (Table 4). Declines were therefore greater than for the sheep population over the period (15%). Changes in individual voivodeships were very dynamic. In the period under study, there was a 478% increase in lamb livestock production in the Świętokrzyskie Voivodeship,

Table 4. Dynamics indicators for lamb livestock production in the voivodeships of Poland 2005-2023

Voivodeships	Dynamics of change in total lamb livestock production in years					
	2005-2009	2009-2013	2013-2017	2017-2021	2021-2023	2005-2023
Dolnośląskie	85.32	66.80	73.65	151.22	57.53	36.52
Kujawsko-Pomorskie	166.33	78.53	171.09	143.38	105.73	338.78
Lubelskie	74.32	48.06	139.57	154.57	100.20	77.20
Lubuskie	480.00	108.33	11.54	533.33	62.50	200.00
Lódzkie	75.56	47.58	132.03	56.21	88.42	23.60
Małopolskie	125.56	59.43	48.69	100.49	75.61	27.60
Mazowieckie	93.67	49.76	226.21	175.54	112.47	208.14
Opolskie	214.29	23.33	142.86	36.67	81.82	21.43
Podkarpackie	118.32	62.39	62.41	163.64	83.33	62.83
Podlaskie	113.62	75.83	105.70	86.52	77.34	60.94
Pomorskie	80.86	89.05	96.43	145.68	118.08	119.43
Śląskie	134.53	118.33	37.75	178.36	51.46	55.16
Świętokrzyskie	822.22	113.51	41.67	294.29	50.49	577.78
Warmińsko-Mazurskie	80.41	71.79	129.46	71.72	89.42	47.94
Wielkopolskie	65.69	65.24	66.36	120.19	108.98	37.25
Zachodniopomorskie	66.02	82.35	110.71	156.45	51.55	48.54
Poland	98.95	66.93	84.73	126.65	89.72	63.76

Source: own compilation based on Local Data Bank data (GUS BDL, 2024)

a 239% increase in the Kujawsko-Pomorskie Voivodeship and a 100% increase in the Mazowieckie and Lubelskie voivodeships. At the other extreme were the Opolskie (down 79%), Łódzkie (76%), Małopolskie (72%) and Wielkopolskie (63%) voivodeships. As a rule, therefore, decreases in lamb livestock production were recorded in the voivodeships with the largest sheep populations and increases in regions with small sheep populations. In addition to slaughterings, attention should be drawn to the importance of the live animal export factor. This has been greatly reduced as a result of protests by animal rights organisations. The most favourable period was 2017-2021, when increases in live lamb production occurred in as many as 12 voivodeships. On the other hand, the most decreases were in the period 2009-2013 (in 13 voivodeships). In contrast, the first years of membership were fairly stable.

CHANGES IN THE LEVEL OF CONCENTRATION OF SHEEP POPULATIONS AND LAMB LIVESTOCK PRODUCTION IN POLAND FROM 2005 TO 2023

The Gini coefficient for sheep populations in Poland indicated a decrease in concentration in favour of a more even distribution of sheep numbers across voivodeships (Table 5). This result confirms previous findings, i.e. a decrease in sheep populations in significant voivodeships in this production, while an increase in regions with fewer sheep.

Table 5. Gini coefficient for sheep and lamb livestock production in Poland 2005-2023

Specification	Gini coefficient for the studied characteristics in years			
	sheep population		production of live lamb	
	2005	2023	2005	2023
Coefficient from the sample	0.489	0.364	0.484	0.444
Estimated coefficient	0.521	0.389	0.519	0.473

Source: own study

There were similar patterns in the case of lamb livestock production. However, the scale of changes in the concentration of this production in several voivodeships was not large. In addition, the degree of concentration for the studied traits was presented graphically in the form of Lorenz concentration curves (Figure 3).

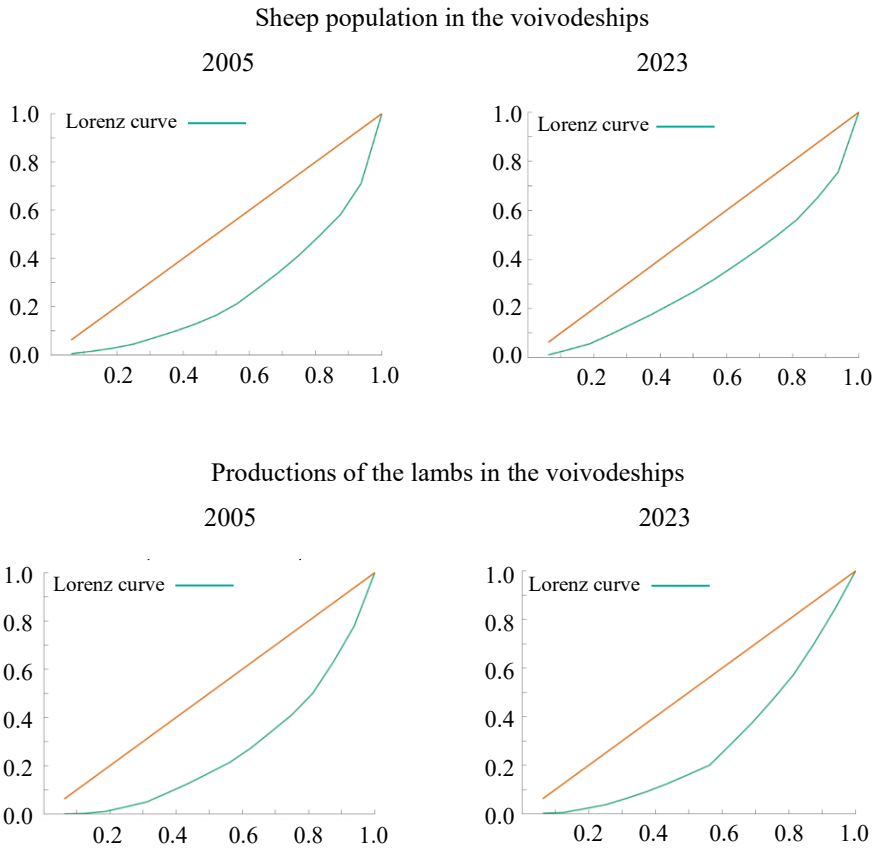

Figure 3. Lorenz concentration curve for sheep population and lamb livestock production in Poland 2005-2023

Source: own compilation based on Local Data Bank data (GUS BDL, 2024)

DISCUSSION

Rokicki, Perkowska and Ziółkowska (2020) indicates that concentration in livestock production has increased. As a result, there was an even greater concentration of activity in several voivodeships. The exception was sheep production, where there was a reduction in the concentration of sheep populations and lamb meat production. In our study, we obtained similar results for sheep production. Musiał (2018), using the example of the Polish Carpathian Mountains area, noted that sheep production was abandoned or reduced in volume mainly by farms that had little contact with the market. In mountainous areas, sheep are responsible for maintaining the landscape, biodiversity. In our study, we found

a large decline in sheep populations and livestock production in voivodeships located in the Carpathian Mountains, including the Małopolska Voivodeship. Sroka (2018) pointed out the importance of subsidies for sheep production, which support this type of activity and encourage an increase in production. We agree with this view and also point out the importance of public support for sheep production. Niżnikowski, Rokicki, Łaba and Krajewski (2017) points to the importance of the income factor in sheep production. When the profitability of this activity improves, livestock and livestock production increase. Rokicki (2018) also showed a significant relationship between the share of grassland in agricultural land and sheep stock in the voivodeships. He also pointed out large disproportions between voivodeships, as there were voivodeships with large populations and stocking rates of these animals, but also territorial units with very small numbers of sheep. In turn, Wiktorowski (2011) states that regional policy should be created with reference to regional conditions, using the so-called place factor. These determinants are particularly evident in the case of sheep production.

De-Arriba and Sánchez-Andrés (2014) point to the long tradition of sheep breeding in Eastern Europe and to changes resulting from the economic transformation. There was a decline in the sheep population in EU countries and in the production of live lambs. Similar trends were observed by Popescu, Stanciu and Antonie (2022) in relation to the countries with the largest sheep population in the EU. In general, the sheep population in Poland was very small compared to other EU countries. According to Guyomard et al. (2021), animal production, including sheep production, is supported in the EU through CAP tools such as improving animal welfare, the farm-to-fork strategy, organic farming, protection of agricultural areas with high landscape diversity, and protection of sheep breeds from extinction. Boix-Fayos and de Vente (2023) point to an important goal, which is the sustainability of agriculture. In this aspect, sheep production fits into the stated goal. The implementation of the environmental objectives included in the CAP is also intended to support farmers' incomes.

CONCLUSIONS

The following conclusions can be drawn from the research carried out.

1. Sheep farming in Poland was concentrated in several voivodeships. However, the level of concentration of this activity decreased in subsequent years. As a rule, the greatest falls in sheep populations were in the voivodships maintaining the largest number of these animals, while the greatest rate of increase was in regions with small numbers. In the first years of accession, sheep populations declined in the largest number of voivodeships, while they declined in the smallest number of regions between 2013 and 2017.

2. There were changes in the structure of the sheep population and a reduction in the proportion of ewes. This may have been caused by a change of use, but also by market requirements. For export, lambs were sold within 100 days of birth. The domestic market, on the other hand, required larger heads, making it necessary to keep lambs for up to six months or even longer.
3. The regional distribution of lamb livestock production in Poland was different from that of the sheep population. The changes were very large and generally affected the voivodeships with the largest sheep populations. Other than for the sheep population, there were also periods that were the most favourable for lamb livestock production (2017-2021) and the worst (2009-2013). Of great importance was the abandonment of exports, but also the location of slaughterhouses close to large markets
4. The research hypothesis was confirmed in terms of small changes in sheep populations and lamb livestock production in Poland. These were 15% and 29% respectively between 2005 and 2023. At the same time, as a rule, the largest decreases in sheep stock and lamb livestock production were in voivodeships with a high importance of this activity.

BIBLIOGRAPHY

Boix-Fayos, C., de Vente, J. (2023). Challenges and potential pathways towards sustainable agriculture within the European Green Deal. *Agricultural Systems*, *207*, 103634. DOI: 10.1016/j.agsy.2023.103634.

De-Arriba, R., Sánchez-Andrés, A. (2014). Production and productivity in Eastern and Western European sheep farming: a comparative analysis. *Livestock Research for Rural Development*, *26* (4), 66-76.

GUS BDL (Statistics Polanad, Local Date Bank). *Agriculture. Animal production*, https://bdl.stat.gov.pl/bdl/dane/podgrup/temat/6/182/1443, access 10.12.2024.

Guyomard, H., Bouamra-Mechemache, Z., Chatellier, V., Delaby, L., Détang-Dessendre, C., Peyraud, J.L., Réquillart, V. (2021). Why and how to regulate animal production and consumption: The case of the European Union. *Animal*, *15*, 100283. DOI: 10.1016/j.animal.2021.100283.

Kopiński, J. (2009). Stan i prognozowane kierunki zmian pogłowia zwierząt gospodarskich w Polsce do roku 2020 (Status and forecasted directions of changes in the livestock population in Poland by 2020). *Studia i Raporty IUNG-PIB*, *17*, 149-159.

Kopiński, J. (2018). Regionalne zróżnicowanie zmian produkcji rolniczej w Polsce w kontekście oddziaływania na środowisko (Regional variation in changes in agricultural production in Poland in the context of environmental impact). *Economic and Regional Studies*, *11* (1), 59-75. DOI: 10.29316/ers-seir.2018.05.

Kuś, J., Matyka, M. (2014). Zmiany organizacyjne w polskim rolnictwie w ostatnim 10-leciu na tle rolnictwa UE (Organisation changes in Polish agriculture in the last 10 years on the background of the EU). *Zagadnienia Ekonomiki Rolnej*, *4*, 50-67.

Matyka, M., Krasowicz, S., Kopiński, J. (2016). Zmiany produkcji rolniczej w Polsce w latach 2000-2014 (Changes in agricultural production in Poland between 2000 and 2014). *Studia BAS*, *4* (48), 7-36.

Matyka, M., Krasowicz, S., Kopiński, J., Kuś J. (2013). Regionalne zróżnicowanie zmian produkcji rolniczej w Polsce (Regional differentiation of changes in agricultural production in Poland). *Studia i Raporty IUNG-PIB*, *32* (6), 143-165. DOI: 10.26114/sir.iung.2013.32.07.

Musiał, W. (2018). *Przyrodnicze, ekonomiczne i społeczne uwarunkowania przemian w rolnictwie obszarów górzystych na przykładzie polskich Karpat*. Ekspertyza (Natural, economic and social conditions of changes in agriculture in mountainous areas on the example of the Polish Carpathians. Expert opinion). Warszawa: Towarzystwo Ekonomistów Polskich.

Niżnikowski, R., Rokicki, T., Łaba, S., Krajewski, K. (2017). Sytuacja strategiczna sektora owczarskiego w Polsce – uwarunkowania hodowlane, rynkowe i ekonomiczne (Strategic situation of the sheep-farming sector in Poland – breeding, market and economic conditions). *Przegląd Hodowlany*, *85* (4), 1-6.

Parzonko, A. (2014). Regionalne zmiany produkcji mleka w Polsce – stan i przyczyny (Regional changes in milk production in Poland – state and reasons). *Roczniki Ekonomiczne Kujawsko-Pomorskiej Szkoły Wyższej w Bydgoszczy*, *7*, 218-233.

Pepliński, B. (2017). Regional analysis of changes in the pig population in Poland in 1960-2015. *Annals of The Polish Association of Agricultural and Agribusiness Economists*, *19* (3), 224-230. DOI: 10.5604/01.3001.0010.3253.

Pepliński, B. (2019). *Determinanty regionalnych zmian w sektorze produkcji trzody chlewnej w Polsce* (Determinants of regional changes in the pig production sector in Poland). Poznań: Wydawnictwo Uniwersytetu Przyrodniczego.

Poczta, W., Czubak, W., Pawlak, K. (2009). Zmiany w woluminie produkcji i dochodach rolniczych w warunkach akcesji Polski do UE (Changes in the volume of production and agricultural income in the conditions of Poland's accession to the EU). *Zagadnienia Ekonomiki Rolnej*, *4*, 40-52.

Popescu, A., Stanciu, M., Antonie, I. (2022). Livestock and milk and meat production in the top five EU countries rearing sheep and goats, 2012-2021. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, *22* (3). 515-530.

Rokicki, T. (2018). Zróżnicowanie regionalne produkcji owczarskiej w Polsce (Regional differentiation of sheep production in Poland). *Economic and Regional Studies*, *11* (2), 86-95. DOI: 10.2478/ers-2018-0018.

Rokicki, T., Perkowska, A., Ziółkowska, P. (2020). Changes in the concentration of animal production in Poland. *Annals of the Polish Association of Agricultural and Agribusiness Economists*, *22* (3), 175-186. DOI: 10.5604/01.3001.0014.3529.

Sroka, W. (2018). *Zmiany struktur agrarnych w województwie małopolskim – rozwój czy stagnacja*. Ekspertyza (Changes in agrarian structures in the Małopolska Voivodeship – development or stagnation. Expert opinion). Warszawa: Towarzystwo Ekonomistów Polskich.

Wiktorowski, K. (2011). Rozwój obszarów wiejskich regionu zachodniopomorskiego na tle założeń KSRR 2010-2020 (Development of rural areas of West Pomeranian Region against the background of NRDS 2010-2020 assumptions). *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, *166*, 798-809.

***

ZMIANY W POGŁOWIU OWIEC I PRODUKCJI ŻYWCA JAGNIĘCEGO W POLSCE W LATACH 2005-2023

Słowa kluczowe: owce, pogłowie owiec, produkcja mięsa, rynek mięsa jagnięcego, zróżnicowanie regionalne

ABSTRAKT. Głównym celem badań było określenie zmian w pogłowiu owiec i produkcji żywca jagnięcego w Polsce, bezpośrednio po akcesji do Unii Europejskiej i w kolejnych latach, a także wskazanie występujących prawidłowości w tym zakresie. Zidentyfikowano również okresy z najwyższym i najniższym pogłowiem i produkcją żywca jagnięcego oraz określono występujące prawidłowości w tym zakresie. Źródła materiałów stanowiły dane zaczerpnięte z Banku Danych Lokalnych GUS. Okres badawczy obejmował lata 2005-2023. Do analizy i prezentacji materiałów zastosowano metody opisową, tabelaryczną, graficzną, wskaźniki dynamiki o podstawie stałej i zmiennej, współczynnik Giniego i krzywą koncentracji Lorenza. Z analiz wynika, że pogłowie owiec w Polsce po akcesji do UE spadło o 15%, a produkcja żywca jagnięcego o 30%. W poszczególnych województwach zmiany pogłowia i produkcji żywca były zróżnicowane. Na ogół liczba owiec zmniejszała się w województwach z dużą populacją tych zwierząt, a zwiększała w regionach o najmniejszym znaczeniu produkcji owczarskiej. Podobne zmiany obserwowano w przypadku produkcji żywca jagnięcego. W rezultacie zmniejszył się stopień koncentracji zarówno pogłowia owiec, jak i produkcji żywca jagnięcego, przy czym w przypadku pogłowia owiec stopień zmniejszenia się koncentracji był silniejszy.

AUTHOR

TOMASZ ROKICKI, DR HAB.
ORCID: 0000-0003-3356-2643
Warsaw University of Life Sciences – SGGW
Management Institute
e-mail: tomasz_rokicki@sggw.edu.pl

Proposed citation of the article:
Rokicki, T. (2025). Changes in sheep population and live lamb livestock production in Poland in 2005-2023. *Annals PAAAE*, *27* (1), 205-220.